3.4.2 Mechanical Plant Inspections

Purpose
The purpose of this document is to establish a uniform process for conducting inspections on mechanical wastewater treatment plants.

Mechanical Plant Systems

Activated Sludge Systems (may not be all-inclusive)

- Package Plants
- Extended Aeration
- Sequential Batch Reactor
- Modified/High-Rate Aeration
- Tapered
- Complete Mix
- Bardenpho Process
- Oxidation Ditch
- Contact Stabilization
- Step-Feed
- Re-aeration
- Conventional
- Pure Oxygen
- Kraus Process

Fixed Media Systems (may not be all-inclusive)

- Trickling Filter
- Rotating Biological Contactors
- Biofilter Tower (Activated Biofilter)
- Sand Filter

Pre-Inspection Activities
During the pre-inspection portion of the inspection, the inspector will collect and organize the information and equipment needed to conduct the site inspection. The pre-inspection procedures are generally conducted in three phases.

- File Review - The inspector shall obtain files for review of past inspection reports, issued operating and construction permits, reports required by the permit, and any history of violations or other regulatory issues.

  The inspector should familiarize themselves with the permit requirements and effluent parameters, limitations, and sampling frequencies.

  The Discharge Monitoring Reports are to be reviewed to determine if there is any history of non-compliance with effluent limitations, or failure to submit reports to the department.

- Paperwork – The inspector should make a copy of the permit, Standard Conditions Part I, Part II (if applicable) and Part III, and a copy of the latest revision of the application for renewing the operating permit for the facility (Form B or Form B2) to take on the inspection. Take an extra copy to leave at the facility in the event the operator does not have a copy of the permit at site.

  The inspector shall obtain a copy of an inspection checklist and process checklist, if available, for the type of plant being inspected. These will assist the inspector during the site inspection. The inspector should determine what categories on the process checklist are applicable to the facility. The inspector

should write "NA" (Not Applicable) into any sections on the checklist that are not present at this particular facility to help prevent any confusion.

- Sampling and Monitoring Equipment - The inspector shall review the permit to determine what pollutant parameters are listed in Table A. This will assist the inspector in collecting the proper monitoring and sampling equipment. The inspector shall then collect the proper equipment. Typical equipment should include thermometer, pH meter, conductivity meter, dissolved oxygen meter (or combination of), a Hach NI-8 Ammonia Mid Range Test Kit, and a Total Residual Chlorine Meter.

  A calibration of field meters should be conducted. This will help to ensure that the equipment is in working condition. In addition, the inspector shall ensure that the field meters have been through a recent Quality Assurance/Quality Control (QA/QC) analysis. See Chapter Four, Environmental Sampling, for information on how to prepare and calibrate equipment.

  The inspector is to prepare a sampling kit. At a minimum, the kit should include:
  - distilled water bottle for rinsing of equipment
  - protective gloves suitable for the sampling event
  - sample transport cooler(s)
  - ice
  - sample containers and labels
  - correct preservatives (see MDNR-FSS-001)
  - sterilized Nalgene™ bottle or sterile Whirl Pak™ bag (with sodium thiosulfate if the effluent is chlorinated)
  - In addition, a hard hat, hearing protection and safety glasses should be brought along during the inspection. The inspector should wear steel-toed boots. Additional safety equipment may be needed depending on the location and site characteristics of the facility.

The inspector is to ensure that a copy of the Environmental Services Program Field Services Standard Operating Procedures MDNR-FSS-001 and ESP Field Services Field Sheets and Chain-of-Custody MDNR-ESP-002 is taken on the inspection.

Numbered and blank sample tags are to be obtained and brought during the inspection (See MDNR-FSS-003).

The inspector is to obtain a camera, GPS unit and spare batteries for all equipment to bring on the inspection. GPS readings are needed for new outfalls and any existing outfalls that have not had a GPS reading collected. The inspector must follow current department/program GPS collection and reporting procedures.

On-Site Inspection Activities

Site entry and initial briefing should be conducted at the facility in accordance with Chapter 3.1, General Inspection Procedures. If available, the inspector should speak with the plant operator or the worker with the most experience operating the facility. The inspector

should explain the purpose, scope, and department authority for the inspection.

Several checklists are referenced and can be found in the checklists and forms section of this section.

When accessing the site, the inspector should note the presence of an all-weather access road to the facility. Because sludge is to be removed from this type of treatment facility routinely, an access road that will allow access to the plant by sludge removal equipment must be provided. In addition, the inspector should determine if the facility is protected from unauthorized access by an adequate security fence and appropriate warning signs.

The inspection tour of the plant shall begin at the headworks of the plant. Depending upon plant configurations, different primary treatment methods may be encountered. Primary treatment may include the following:

- Screening – Screening systems are used to remove wood, roots, rags, and large debris. The screened items are either hauled to a landfill or, if possible, ground up and returned to the plant flow. Typical components used for screening debris include bar screens and shredders. The inspector can use the Bar Screen Checklist or Comminutor Checklist for assistance in completing the inspection of the screening system(s).

- Grit Removal – Grit is to be removed early in the treatment process because it is abrasive and will damage equipment. Typical components for removal of grit include grit channels and aerated grit chambers. The inspector can use the Grit Removal Checklist for assistance in completing the inspection of the Grit Removal system(s).

- Primary Clarifier – Settleable and floatable materials are removed from the treatment process. The inspector can use the Primary Clarifier Checklist for assistance in completing the inspection of the primary clarifier system.

A component of a wastewater treatment facility that is not considered treatment but necessary for plant operation and reporting requirements is the flow-measuring device. Not all facilities will have a flow-measuring device, as some facilities measure flow from the effluent only. Flow measuring devices include Parshall flumes, weirs, magnetic flowmeters and ultrasonic flowmeters. The inspector should observe and note the operational status of the flowmeter.

Next, the inspector is to observe the secondary treatment process used at the facility. The Activated Sludge Checklist, Rotating Biological Contactor Checklist, Trickling Filter Checklist, Sand Filter Checklist, and Activated Biofilter Checklist can be helpful.

Key items for the inspector to observe at an activated sludge facility include:

- Color, odor, and level of foaming of the mixed liquor in the aeration tank. The color should be light to dark brown. The odor should be an earthy smell. Foaming should be light.

- Note any dead spots in the aeration tank.

- The condition of the components of the system (rusting, non-operational, missing components, earthen basin erosion, etc)

The inspector should proceed to the secondary clarifier system that follows the activated sludge system. Here, settleable and floatable materials are further removed from the treatment process. The inspector can use the Secondary Clarifier Checklist for assistance in completing the inspection of the secondary clarifier system.

Key items for the inspector to observe at a fixed media facility can include:

- Color of organic growth on media - the color of the organic growth should be green to light brown.

- Odor - the odor from the media should be earthy.

- Uneven flow distribution - this can be detected by dry areas on the media or, no organic growth in areas.

- Are nozzles clogged or frozen - this can be detected by observing the spray pattern.

- Filter media clogged - this can be detected if ponding of wastewater is observed on the media, a growth of vegetation is on the media or, an overgrowth of the organic material is present.

- Note the condition of the system for rusting, non-operational or missing components.

When inspecting the secondary clarifier of a fixed media system use the Secondary Clarifier Checklist for assistance.

If disinfection of the effluent occurs at the facility, the inspector observes the components of the disinfection unit(s). The use of the Ultraviolet (UV) Disinfection Checklist and Chlorination Checklist may be helpful.

Observe the sludge holding or sludge treatment structures used at the facility. Be certain that they are intact and the sludge is not at or near overflowing. The use of the Aerobic Digester Checklist and Anaerobic Digester Checklist can be helpful. If sludge is land applied see the University of Missouri Extension - Environmental Quality Publications for additional information.
Documentation is an important part of the inspection process, so record observations made during the inspection in the field notebook. Field

notes are subject to Sunshine Law requests, therefore ensure that the notes taken are relevant to the inspection.

The inspector should take pictures of items of concern, as they conduct the inspection. This will help the inspector to correlate notes taken in the field with what the inspector viewed, while writing the inspection report. In addition, photos are very important for any enforcement case.

Inspection Sampling
Effluent - Each inspection shall include collecting samples of the effluent being discharged into the receiving stream. The determination of the chemical and the physical condition of effluent and its effect upon the receiving stream are among the most important components of the inspection. Compliance with effluent limitations does not always show the inspector whether the facility is in compliance with the permit. The inspector shall also use field equipment and direct observations to conduct water quality monitoring. Water quality monitoring with field equipment is to include but not limited to:

- pH (MDNR–FSS-001)
- Dissolved Oxygen (MDNR-FSS-003)
- Conductivity (MDNR-FSS-102)
- Temperature (MDNR–FSS-001)
- Ammonia as Nitrogen (MDNR–FSS-001)

All sampling is to be conducted in accordance with Environmental Services Program Field Services Standard Operating Procedures. The inspector should review MDNR-FSS-005 for additional considerations for obtaining samples. Samples can include but are not limited to:

- Biochemical Oxygen Demand$_5$ (MDNR–FSS-001)
- Total Suspended Solids / Non-filterable Residue (NFR) (MDNR–FSS-001)
- Fecal Coliform (MDNR–FSS-001 and MDNR-FSS-108)
- Total Residual Chlorine – if Chlorine may be present in the discharge or receiving stream (MDNR-WQMS-016)
- Ammonia as Nitrogen (MDNR–FSS-001)
- Total Phosphorus as P (MDNR–FSS-001)
- Oil & Grease (MDNR–FSS-001)
- Chloride (MDNR–FSS-001)

Instream Monitoring - The inspector is to observe the stream above and below the outfall location. The inspector should attempt to determine if there are there any unusual odors of the water in the stream? Are there visible color differences between upstream of the outfall and downstream, and are there any visible bottom deposits?

Downstream sites should be observed or sampled first. The inspector should work their way upstream while monitoring and sampling to prevent

stirring of sediment in bottom of creek that could affect downstream results.

Operational Monitoring - The operational control monitoring requirements, listed in 10 CSR 20-9.010, are not required at all facilities. However, the monitoring can be conducted to assist the inspector in determining the health of the wastewater treatment plant. A dissolved oxygen meter reading in the aeration chamber will assist in determining if good mixing and aeration are occurring. In addition, the use of a pH meter in the aeration chamber will assist the inspector in determining the overall heath of the plant.

The inspector should review all onsite documentation that is required by the permit. The inspector shall ask to see if the facility has a copy of the Missouri State Operating Permit and Standard Conditions I, II (if necessary), and III. If they do not have available copies, the inspector is to provide a copy to the facility. The inspector should review the requirements and conditions of the permit with facility staff. In addition, the inspector should determine if there have been any changes at the facility, which are not listed on the permit, such as address, owner, continuing authority, and facility description. Provide a copy of the latest revision of the application for renewing the operating permit to the facility [Form B (MO-780-1512) or Form B2 (MO-780-1805)].

In accordance with Standard Conditions Part I, the facility is required to retain records of all monitoring information. This is to include all calibration and maintenance records, all original strip chart recording for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. Records are to be maintained for a period of at least three (3) years from the date of the sample, measurement, report or application. In addition, the permittee shall maintain records on file at the facility for at least five years for the items listed in Standard Conditions Part III and any additional items listed in the Special Conditions section of the permit.

Laboratory Inspection - If the facility has an onsite laboratory, the inspector should inspect the laboratory to determine if it is functional and in operational condition. The inspector should discuss with facility staff responsible for collecting samples the methods used for sample collection. In addition, the inspector should determine if the facility is performing any quality assurance/quality control procedures on the laboratory equipment to ensure that reliable and accurate data is being collected and reported to the department. The inspector should use the Laboratory Inspection Checklist.

If the facility has an outside laboratory performing analyses for the required sampling, the inspector should obtain and record the name and location of the contract laboratory. This information should be included in the inspection report.

Post Inspection Procedures
Meet with the facility representatives and/or operator after the physical inspection and conduct an exit interview.

If unsatisfactory features were discovered during the inspection or file review, review the violations with the plant operator or worker familiar with the plant.

If unsatisfactory features are discovered, the inspector should explain what actions would be necessary for the facility to take, to correct the violations.

The inspector should provide the facility contact any recommendations to prevent any future deficiencies.

Completing the Written Inspection Report
The inspector should complete the inspection report and transmit it to the facility and/or permittee in accordance with the guidance provided in Chapter 3.1, General Inspection Procedures.

CHECKLISTS

- Activated Biofilter Checklist
- Activated Sludge Checklist
- Aerobic Digester Checklist
- Anaerobic Digester Checklist
- Bar Screen Checklist
- Comminutor Checklist
- Grit Removal Checklist
- Laboratory Inspection Checklist
- Land Application of Sludge Checklist
- Lift Station Checklist
- Rotating Biological Contactor Checklist
- Sand Filter Checklist
- Secondary Clarifier Checklist
- Trickling Filter Checklist
- Ultraviolet (UV) Disinfection Checklist